

C++ code 5.10.8: Sub-problem (5-10.c): Plotting kite-shaped curve

```
2 void plotKite(const char *filename, double tol = 1.0e-3) {
3     plt::figure();
4     // TODO: (5-10.d)
5     // START
6     // preparing call to adaptedHermiteInterpolant
7     auto c = [](double t) -> Eigen::Vector2d {
8         Eigen::Vector2d ct;
9         ct << std::cos(2 * M_PI * t) + 2. / 3. * std::cos(4 * M_PI * t),
10            3. / 2. * std::sin(2 * M_PI * t);
11         return ct;
12     };
13     constexpr unsigned int nmin = 6;
14     constexpr unsigned int N = 1e5;
15     // initializing x, dsicarding the 1 at the end
16     Eigen::VectorXd x = Eigen::VectorXd::LinSpaced(N + 1, 0, 1).head(N);
17
18     std::pair<std::vector<Eigen::Vector2d>, std::vector<Eigen::Vector2d>> vec =
19         adaptedHermiteInterpolant(c, nmin, x, tol);
20
21     std::vector<Eigen::Vector2d> eval = vec.first;
22     std::vector<Eigen::Vector2d> Sigma = vec.second;
23     const unsigned int M = Sigma.size();
24     Eigen::VectorXd x_hermite(N);
25     Eigen::VectorXd y_hermite(N);
26     Eigen::VectorXd x_poly(M);
27     Eigen::VectorXd y_poly(M);
28     // assembling x and y of Hermite Interpolation
29     for (unsigned int i = 0; i < N; i++) {
30         x_hermite(i) = eval.at(i)(0);
31         y_hermite(i) = eval.at(i)(1);
32     }
33     // assembling x and y of Polygonal Interpolation
34     // We do not need to call ClosedPolygonalInterpolate
35     // as matplotlibcpp will already connect the points
36     // with straight lines for us.
37     for (unsigned int i = 0; i < M; i++) {
38         x_poly(i) = Sigma.at(i)(0);
39         y_poly(i) = Sigma.at(i)(1);
40     }
41     // making the plot
42     plt::title("Adapted Interpolation with tol=" + std::to_string(tol));
43     plt::xlabel("x");
44     plt::ylabel("y");
45     plt::plot(x_poly, y_poly, "r", {{ "label", "Polygonal Interpolant" }});
46     plt::plot(x_hermite, y_hermite, {{ "label", "Hermite Interpolation" }});
47     plt::legend();
48     // END
49     plt::savefig(filename);
50 }
```

Get it on 🐱 GitLab ([adaptiveintp.hpp](#)).